Name: Hung Hong

Title: Report for Program Assignment 1 – Pacman VS Ghosts

DEVIATION FROM ORIGINAL SPECIFICATION & REASON

Based on my own implementation of the AI for the Ghosts, one thing that I have done differently to the specification is the time intervals for Scatter Mode. In the original game, the time intervals are:

1. Scatter for 7 seconds, then chase for 20 seconds
2. Scatter for 7 seconds, then chase for 20 seconds
3. Scatter for 5 seconds, then chase for 20 seconds,
4. Scatter for 5 seconds, then switch to Chase Mode indefinitely

In my implementation, while I also divide the time length into 4 periods, I use different values for the game interval, as the following:

1. Scatter for 200-time units, then chase for 400-time units
2. Scatter for 200-time units, then chase for 400-time units
3. Scatter for 200-time units, then chase for 400-time units
4. Scatter for 200-time units, then switch to Chase Mode indefinitely

The main reason for the change is because I was unsure of how time works in PacMan. In particular, in my code MyGhosts, I use the variable "time" to determine how long have the ghosts been chasing PacMan to determine when to switch from Scatter Mode to Chase Mode and vice versa. However, what I later find is that one-time unit incremented does not necessarily reflect 1 seconds but in fact an amount of milliseconds per node movement that I am unsure about. Another reason is for my own convenience to debug the game, since 200 – 400 are good numbers that I can keep track of easier than a specific set of number which might be hard to memorize (i.e. converting 7 seconds to time units might not be a pretty number). Lastly, I choose not to decrease the scatter time on the 3rd and 4th intervals since I believe it might not affect much to the game experience (in the first place, 2 seconds difference in Scatter Mode is barely noticeable), and it is much easier to implement a fixed time interval between each mode.

Another different thing that I did for my implementation is I allow the ghost to run away from PacMan when PacMan is near to a power pill. This is actually used as a feature in StarterGhosts, and I find that it is a really nice feature to use in my implementation as it gives the ghosts knowledge of the player's plan when getting close to the power bill to flee in advance. Since it is not part of the specification, I think this feature is a nice addition to make the ghosts' AI smarter.

REFLECTION ON THE ASSIGNMENT

When I did the AI implementation for the Ghosts, I found that using the Decision Trees that we learned in the class is a great help as I can make sure not to miss any case for my AI. Since I had to make sure that I hit all the requirements of this assignment, a structured AI implementation was really helpful in making the implementation task time-effective as I spent less time on debugging and error-checking. By working on the AI based on the order of the Decision Tree, the conditions were accounted for as I wrote the code so I did not have to spend too much time looking back and debugging any potential errors along the

implementation. Being time-efficient also meant that I could have more time working on other parts of the project, such as preparing survey questions for playtesting, polishing my report, etc.

Another new thing that I learned from this experience is the basic structure of a game designed on Java, having two main parts: game and controllers. I found out that entries are in fact parts of a controller and is there solely for me (and other students doing this assignment) to extend the existed controllers and for viewability. The examples help a lot as I slowly figured out how the controllers work and ways that I could implement for my own AI. In my experience, I ended up looking into the framework of the game to understand what is going on and along the way learned their ways of coding this game. It was a worthwhile and fulfilling experience learning and understanding other's code to write our own and make an extension for it.

PLAYTESTING ANALYSIS

As part of playtesting, I decided to give the game to 10 people to get a bigger set of data and for a better insight of the current game. I also give them the survey questions so I can gauge the effectiveness in the AI achieving its Aesthetics. As my opinion on the Aesthetic of PacMan VS Ghosts is how challenging it can be for the AI to the players, I end up asking many questions about the difficulty of the game. The list of questions is as follows:

Playing the "random" version:

1. (On a scale of 1 to 5) How would you rate the AI? (1 – Stupid, 5 – Awesome) ___
2. (On a scale of 1 to 5) How would you rate the difficulty of the game? (1 – Easy, 5 – Insane) ___
3. Which ghost do you think is the smartest among all 4? (BLINKY – red, PINKY – pink, INKY – blue, SUE – yellow) _____

Playing the "improved" version:

4. (On a scale of 1 to 5) How would you rate the AI? (1 – Stupid, 5 – Awesome) ___
5. (On a scale of 1 to 5) How would you rate the difficulty of the game? (1 – Easy, 5 – Insane) ___
6. Which ghost do you think is the smartest among all 4? (BLINKY – red, PINKY – pink, INKY – blue, SUE – yellow) _____

General Questions

7. Which version do you prefer? Why? (Random / Improved)

_____

8. Do you understand how the ghost AIs work, by any chance?

_____

9. Have you played PacMan before? If yes, do you notice any difference with my version of PacMan?

_____

10. Anything for improvement of the game, or just anything random that you want to comment about?

_____

All participants to the survey agree that the "improved" version is much smarter than the "random" version, since for "random" version, the rating of the AI for many varies between 1 and 2, whereas for "improved" version, 8 people give a rating of 5, one person gives 4 and another give 3.
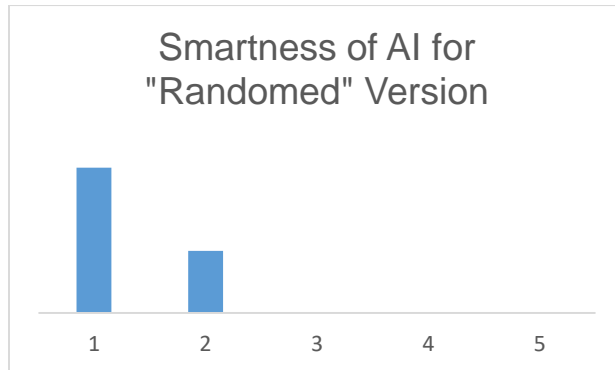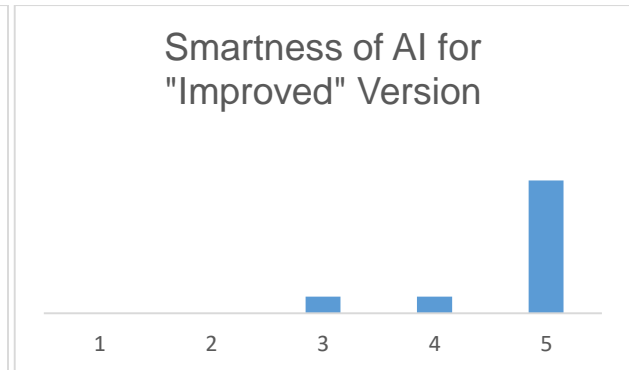

Fig 1 – Result of Question 1

Fig 2 – Result of Question 2

Likewise, the difficulty of the game is vastly different between the two versions since everyone agree that the "random" version is too easy and give a rating of 1, while for the "improved" version, there are 6 people that give a rating of 5, 3 people that give a rating of 4, and only one gives a rating of 3. Based on this result, I will say the implementation is a success since it gives the expected aesthetics that I want for the game. I can also agree to the high rating of the "smartness" of the AI, since the specification of how the AI of each ghost works is rather complex with many unique behaviors that people do not expect.
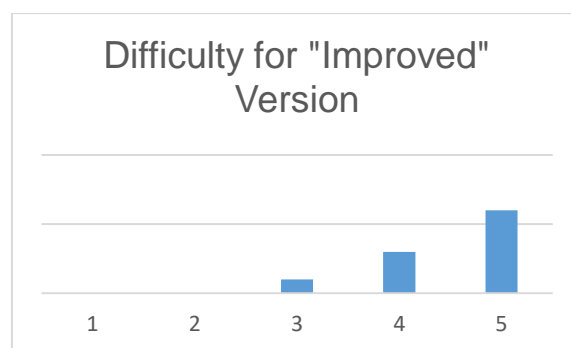

Fig 3 – Result of Question 5

While there are many mixed answers for which ghost is the smartest in the "random" version due to the fact that all ghosts behave similarly, in the "improved" version there are many people voting for INKY as the smartest among all ghosts (with a total of 5 votes), following with PINKY (2 votes), BLINKY (2 votes) and SUE (1 vote). Interestingly, the one that said SUE is the smartest also mentioned how unpredictable SUE is since the ghost just could not make up their minds whether to or not to chase the player and thus

he could not predict how SUE works at all. Moreover, many agree BLINKY is obnoxiously annoying as it follows the player consistently, even though its behavior is rather predictable among the four ghosts.
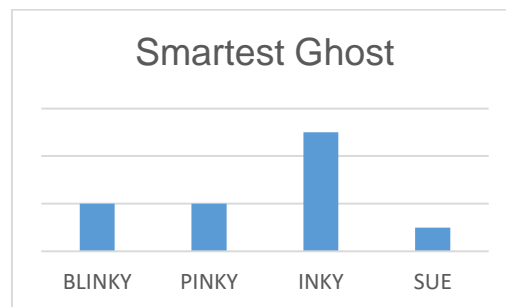

Fig 4 – Result of Question 6

Everyone agrees that the "improved" version is better as it posed a greater challenge to them and generally they had more fun playing the games. 3 people mentioned that the "random" version was tedious and somewhat idiotic since the ghosts did not care for the player at all. When I ask how much do they know about the implemented AI, most people figure out that BLINKY chases directly to you and PINKY plans the move ahead, but only 2 people know about INKY and SUE' behaviors since they have read the article on how the AI in PacMan works before. All of them have played PacMan before, but it was so long ago that most just said they did not pay much attention to the difficulty, with one person did not believe that the experience when playing PacMan was not as "stressful" back then for him. Lastly, most simply complimented the great AI of the game on the last question, while one person suggested having the AI increased its difficulty over time, start off similarly to the "random" version at first and later upgrade to the "improved" version later on as the player collects more pills.

CONCLUSION

In the end, the playtesting is a success as they all happy to play the game and they really like how the AI works in the "improved" version of the game. They also acknowledge how the game experience is elevated when the AI is improved as it gives them more incentives to play the game as a challenge and to "outsmart" the AI. Personally, I am fascinated with the end result as well, as the ghosts are much "smarter" and possess more complex behaviors and turn the game from a boring, tedious pill-collecting game to a strategically-ghost-avoiding game. Not only I learned a lot from this assignment, but I also have a lot of fun especially when testing my implementation.